Contents

Chapter 1. PURPOSE AND NEED

A glossary of the terms, acronyms and abbreviations used in this Environmental Assessment (EA) is provided in **Appendix A**.

1.1. Introduction

On September 2, 2003, Vermont Electric Power Company, Inc. ("VELCO"), filed an application with the U.S. Department of Energy ("DOE") to amend two Presidential Permits (PP-66 and PP-82) for the construction, operation, maintenance, and connection of electrical facilities that cross the United States – Canada border in two places within the State of Vermont. The Secretary of Energy has the authority to grant or deny such an amendment with concurrence by the Secretary of Defense and the Secretary of State. VELCO's Notice of Application was published in the Federal Register on October 9, 2003 (68 FR 58320). The facilities would be constructed, operated, and maintained by VELCO for itself and pursuant to agreements with the Vermont electric utilities that own a portion of the facilities. The two interconnections would be used to transmit electric energy between Hydro-Québec in Canada and VELCO in the United States.

Upon issuance of a Presidential permit, no material change may be made in the way the facilities are operated unless such change has been approved by the Department of Energy (DOE). Before

a Presidential Permit may be issued or amended, DOE must determine that the proposed action would not adversely impact on the reliability of the U.S. electric-power-supply system. In addition, DOE must consider the environmental impacts of the proposed action (i.e., granting the Presidential Permit with any conditions and limitations, or denying it) pursuant to the National Environmental Policy Act of 1969 (NEPA). DOE also must obtain the concurrence of the Secretary of State and the Secretary of Defense before taking final action on a Presidential Permit application.

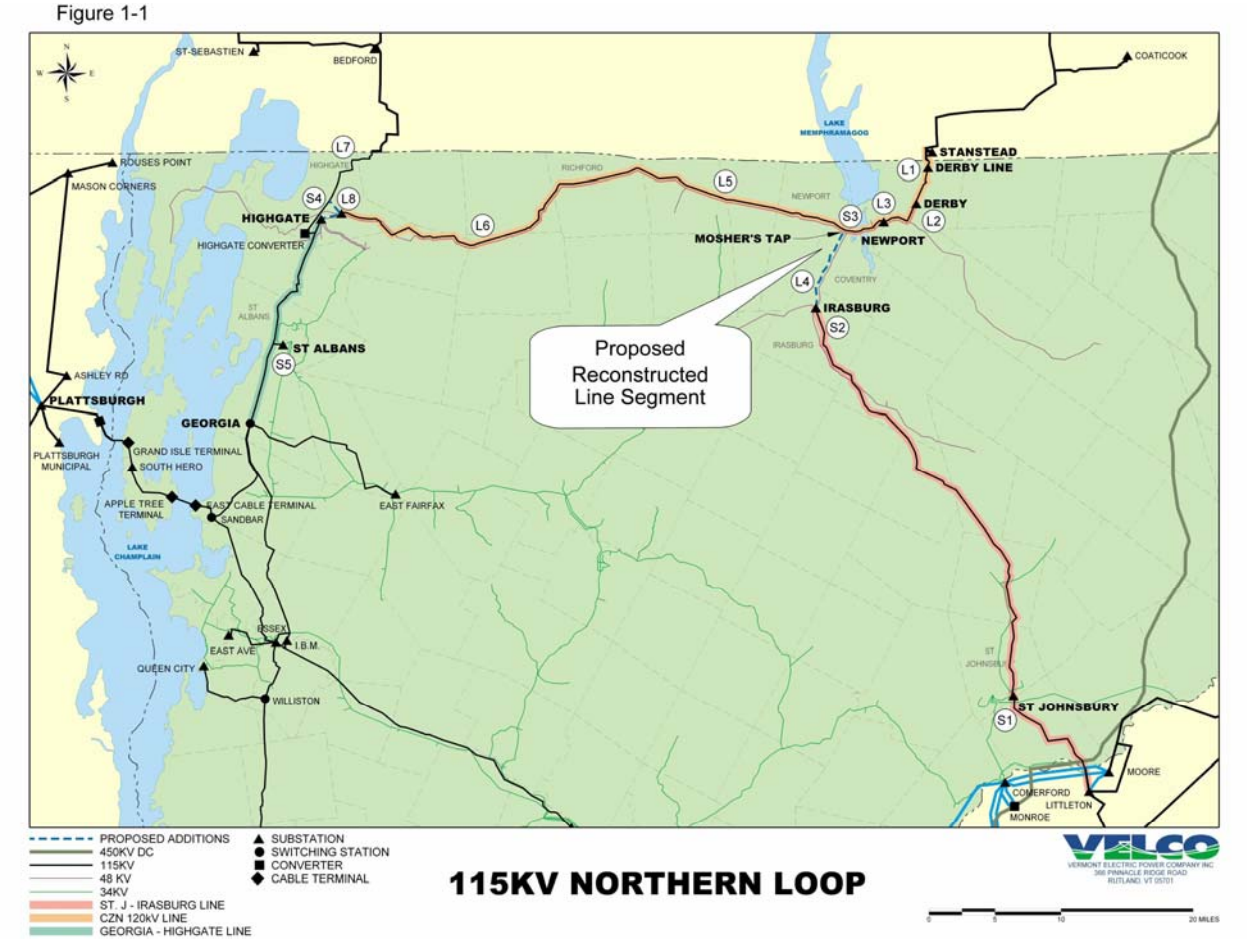
This Environmental Assessment (EA) is intended to be a concise public document that assesses the probable and known impacts to the environment from VELCO's Proposed Action and alternatives and reaches a conclusion about the significance of the impacts. This EA was prepared in compliance with NEPA regulations published by the Council on Environmental Quality (40 CFR 1500-1508) and implementing procedures of DOE (10 CFR 1021).

1.2 Project Summary

The electric system in northern Vermont (that portion essentially north of a line drawn from VELCO's Georgia Substation in Vermont to a substation located in Littleton, New Hampshire) is currently served by a potentially unreliable transmission system. The total load of approximately 150 megawatts (MW) in that area is supplied by two 115-kV and one 120-kV radial lines and a weak underlying 34.5-kV and 46-kV sub-transmission network. At intermediate-to-peak levels of electrical load, a loss of the 115/120-kV lines results in the inability to serve the entire electrical load in that area. The Northern Loop Project, as described in this EA, will substantially reduce or eliminate the loss of load exposure that exists today.

The three radial 115/120-kV lines are shown geographically in Figure 1-1 below, and schematically in the subsequent Figure 1-2 (showing the current configuration of the three lines).

Figure 1-1



Beginning on the western side of the state and working clockwise around the northern Vermont area, the first radial line originates at the Georgia Substation and terminates at the VELCO Highgate Substation. This line provides a voltage source for the Highgate converter-station tap and serves the load and generation at the VELCO Highgate and St. Albans Substations. A loss of this line renders the Highgate Converter Station inoperable and therefore interrupts a significant

source (normally up to 200 and as much as 225 MW) of electrical supply to Vermont via the Highgate Interconnection Facilities from Bedford, Québec.

The next line extends from the Highgate Substation (formerly owned by Citizens Utilities) and easterly across the northern part of the state to the Derby Interconnection Facilities located at the border at Stanstead, Québec. This line serves electrical load at the Newport and Citizens Highgate Substations and is commonly referenced as the "block load," which means that the load served by this line is electrically isolated from the New England system and supplied directly by the Québec system.

The third line originates at Littleton, New Hampshire, and terminates at VELCO's Irasburg Substation. This line serves the St. Johnsbury and Irasburg Substation electrical loads.

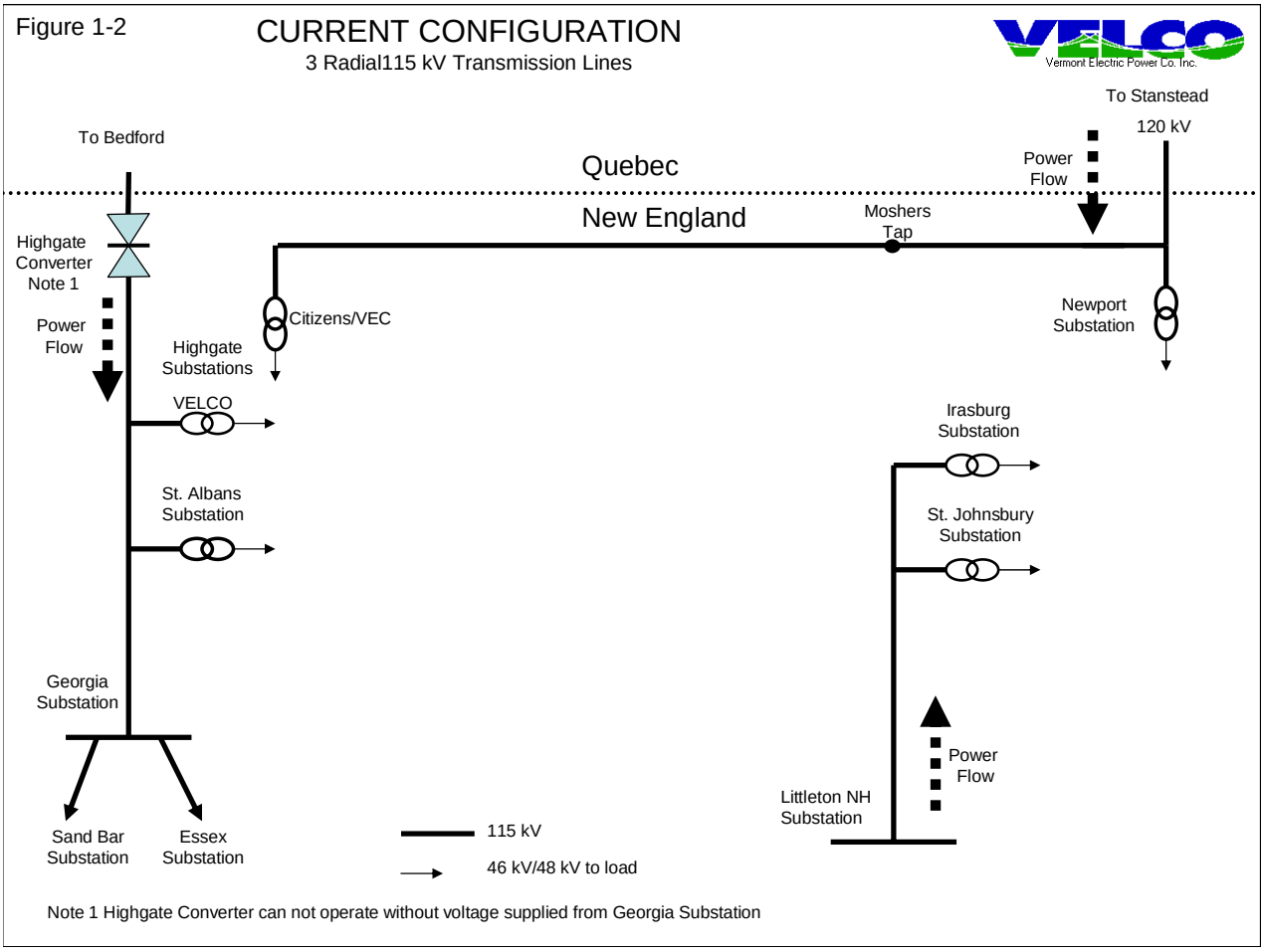
Figure 1-2 shows these lines in their current configuration schematically:

Overview.

The Northern Loop Project involves substation[1] upgrades at three existing substation locations (St. Johnsbury, Irasburg, and Highgate), additional line equipment at two tap[2] points (where

---

1 "Substation" means a structure, usually a small building on a fenced-off lot, that contains any combination of routing or cutoff switches, transformers, surge arresters, capacitors, power conditions and other equipment needed to ensure smooth, safe flow of current. Substations are most commonly seen in residential and industrial areas, where one or more high-voltage lines can often be feeding into the station and any number of lower-voltage distribution lines spider out to serve customers in the surrounding area (Ref.: www.energyvortex.com).



transmission lines are connected to other transmission lines without circuit breakers and associated protection equipment) – Mosher's Tap in Newport and the St. Albans Tap – and an upgrade of an existing 6.47-mile, 48-kilovolt ("kV") radial[3] transmission line, located between VELCO's Irasburg Substation and Mosher's Tap, to accommodate a new 115-kV transmission circuit (see Figure 1-1).

---

2 A "tap" broadly refers to any terminal where an electric connection is established and most commonly refers to a terminal or connection that draws a certain amount of current from part of a circuit. Tapping a circuit can refer either to running a line or cable from a point in a circuit or to the drawing of electricity from that circuit. Just as a water tap allows one to draw a certain amount of water from the total supply, an electrical tap serves the same function for drawing electricity from a source of supply (Ref.: www.energyvortex.com).

3 "Radial line" refers to a transmission line, distribution line or transmission/distribution subsystem that is not interconnected with other systems, so named because it radiates outward from another transmission system without bridging any other systems (Ref.: www.energyvortex.com).

With these upgrades, VELCO proposes to integrate most of an existing 120-kV, Derby-to-Highgate line, formerly owned by Citizens, into the VELCO system. Once connected or "looped,"[4] the 120-kV line, would be operated at 115-kV (the voltage used on VELCO's system and on the rest of the Northeast power grid), and would convert radial transmission lines in northern Vermont into a loop between VELCO's Georgia Substation and the Public Service Company of New Hampshire (PSNH) substation in Littleton, New Hampshire.

Utilities serving northern Vermont supply approximately 150 MW of peak load – about 15% of Vermont's peak requirements – through three radial 115-kV/120-kV lines: (1) the 115-kV transmission line between Littleton, New Hampshire, and Irasburg, Vermont, with about 30 MW of load; (2) the VELCO 115-kV line between Georgia and Highgate, Vermont, serving about 50 MW of load; and (3) the former Citizens' 120-kV line between Derby and Highgate, Vermont, with about 70 MW of load.

Of the total 150 MW, 80 MW is fed radially from the VELCO system and has no effective back-up. The 70 MW balance is supplied directly by Hydro-Québec and radially fed from 120-kV tie at Stanstead, Québec, operated by the TransEnergie division of Hydro-Québec. The transmission-line system supplying the 70 MW cannot be connected to the New England system at the same time because the Hydro-Québec system is not electrically synchronized with other systems in the Northeast.

---

4 In the energy industry, a "loop" is a distribution circuit supplied by two sources of energy. One source serves as a back-up in case the primary source of energy is interrupted (Ref.: www.energyvortex.com).

Radial lines are lines that are connected to the New England power grid at only one end. As such, outages on these lines would result in load that could not be served because electric power could not be supplied by way of an alternative transmission path.

Existing Facilities.

Citizens' Vermont distribution system – now purchased by Vermont Electric Cooperative, Inc., (VEC) – is normally fed from TransEnergie's Stanstead tie. The Stanstead tie connects to what was Citizens' 120-kV network (120 kV is the nominal voltage used in the Québec system *vs.* 115 kV which is typically used in New England) at the Derby Interconnection Facilities that normally feed VEC's "Northeast-Central Load" and the "Northwest Load" (defined below in Section 1.3.1). That line currently crosses the border at Derby Line, Vermont, to supply a substation located about 565 feet from the border and also Newport Substation. These facilities, which operate at 120 kV, in turn connect to a double-circuit (120-kV/48-kV) transmission line 52 miles in length that connects the Newport Substation and VEC's Highgate Substation located in northwestern Vermont; see Figure 1-1.

This line's higher-voltage, 120-kV, circuit steps down to lower voltages at both Newport and Highgate Substations; the lower-voltage, 48-kV, line serves both substations and several additional substations between Newport and Highgate. At Mosher's Tap, located approximately three miles west of Newport Substation, a 48-kV line runs six miles south to VEC's Irasburg Substation and then connects into VELCO's Irasburg Substation.

VEC can be tied at 48 kV to the VELCO system either through the VELCO Highgate or Irasburg Substations. However, because the TransEnergie system is asynchronous with VELCO's transmission system, VEC must electrically separate its load from one system in order to interconnect with the other. This process is commonly referred to as "block loading."

One of the disadvantages of block loading the VEC system is that VEC must operate its system as a radial extension of either VELCO's or TransEnergie's system in lieu of networking its system. VEC's current, 120-kV, radial connection at Stanstead is the sole feed for its entire (70 MW) Northeast-Central and Northwest Load. Currently, the VELCO and VEC systems are configured for VEC to block load off TransEnergie's system.

VEC has contractual as well as native-load obligations to supply 70 MW of Hydro-Québec power. Only in situations where it is either in the economic interest of VEC's customers to connect to VELCO (which occurs in off-peak hours and with just certain segments of its load), or where part or all of its block of load cannot be served by TransEnergie, does VEC connect some or all of its load to VELCO. There are switching capabilities at both VEC's Highgate and Newport Substations to allow for portions or all of its system to be connected to VELCO. However, insufficient capacity in the VELCO system currently exists to feed both the normally-connected Vermont load and VEC's entire 70-MW load at intermediate- to peak-load levels in Vermont.

VELCO's 115-kV Irasburg line originates in Littleton, New Hampshire; runs north to St. Johnsbury, Vermont, to supply (by this radial line) about 30 MW of peak load in the St.

Johnsbury area; and terminates 36 miles further north at Irasburg, where it feeds the underlying sub-transmission system and provides the back-up feed for VEC's Northeast-Central Load. VELCO's Highgate line originates in Georgia, Vermont, and runs 17 miles north to its termination in Highgate where it supplies local load and provides a back-up feed for VEC's Northwest Load; it supplies (radially) about 50 MW of peak load via a tap that serves the St. Albans area, located seven miles north of Georgia.

New Facilities.

By rebuilding 6.47 miles of the existing, 48-kV transmission line to 115-kV from Irasburg to a tap position on the 120-kV line (which would now be operated at 115 kV) purchased by VELCO from Citizens and then connecting the line at Highgate Substation, VELCO would create a 115-kV transmission loop from the PSNH substation in Littleton, New Hampshire, to VELCO's substation in Georgia, Vermont. At the same time, the VEC sub-transmission system (which it purchased from Citizens) would be enhanced by segregating it into two components, each capable of supplying approximately one-half of the total VEC load, with one component continuing to be served off the Stanstead, Québec, interconnection over the Derby Line Interconnection Facilities (subject to PP-66-1) and the other being served from the Bedford, Québec, interconnection over the "Highgate Interconnection Facilities" (subject to PP-82).

1.3 Purpose And Need

1.3.1 Applicant's Purpose and Need

The purpose of the Northern Loop Project is to improve reliability by eliminating two of the radial feeds described in the previous section, currently used to serve approximately 80 MW of load supplied by VELCO's system, by connecting VELCO's existing 115-kV lines terminating in Irasburg and Highgate with the existing 120-kV line formerly owned by Citizens – and before Citizens sold its distribution system to VEC – and then providing VEC with two feeds (instead of only one today) for the remaining 70 MW of load. VELCO's looped facilities would also provide back-up service to the VEC load that is normally block-loaded to TransEnergie to serve the "Northeast-Central Load" (VEC's service area in the eastern and central part of northern Vermont) and the "Northwest Load" (VEC's service area in northwest Vermont). At the same time, VEC's 48-kV sub-transmission system would be enhanced by segregating the system into two components – one component continuing to be fed through interconnection facilities at Derby, Vermont (the "Derby Interconnection Facilities") and the other being fed from Highgate Substation – rather than the one feed that supplies all of the electric load today.

Today, VELCO's existing bulk-transmission facilities, allowing for the capacity of the underlying sub-transmission facilities (operated by electric utilities serving retail customers in northern Vermont) are not capable of providing service for the full 150 MW of load at peak and even intermediate conditions on the VELCO system. At intermediate or higher load levels, some portion of the load served by these lines cannot be served if the line is out since the underlying sub-transmission network is not sufficiently strong to support the entire load.

Figure 1-3 (Current Configuration with the loss of a 115 kV source element) demonstrates the results for a loss of the 115-kV line supplying the Irasburg and St. Johnsbury Substations. In this example, load would be shed[5] in the St. Johnsbury area under intermediate- or high-load conditions:

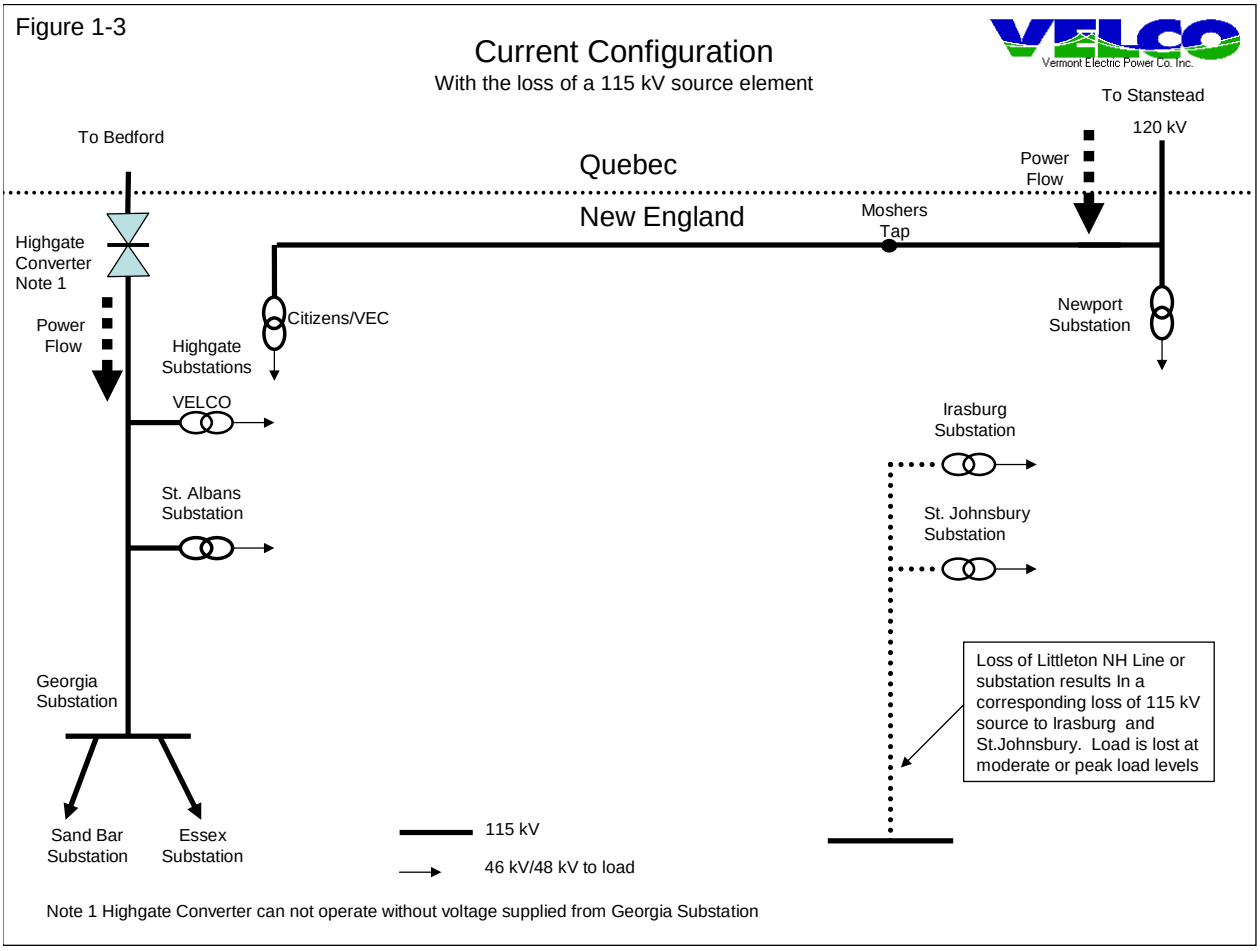
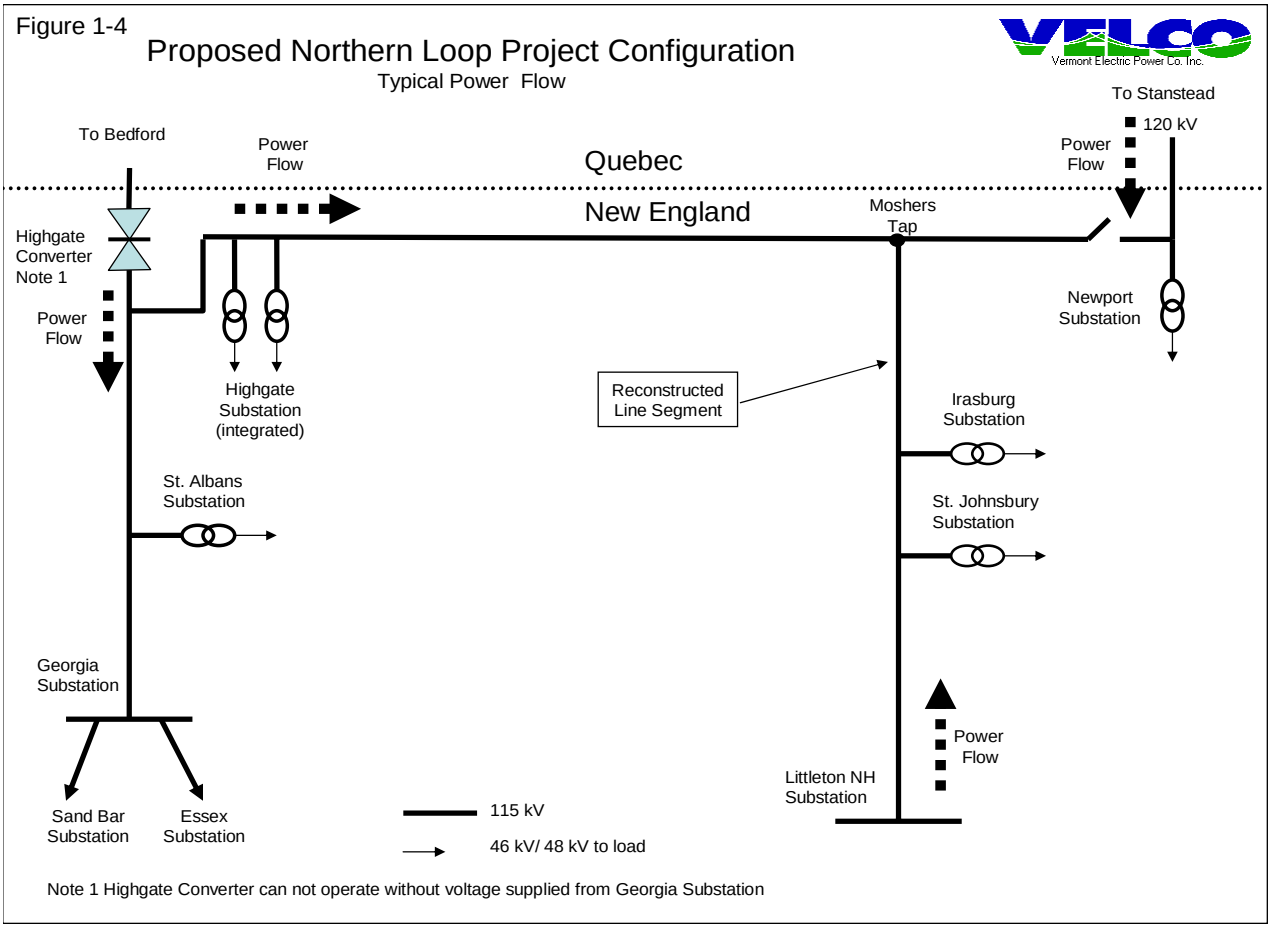


Figure 1-4 describes the system configuration after the project is constructed.

---

5 "Shed" means blocking of customer access to energy, usually due to a temporary shortage of supply. Load shedding is rare and is most commonly applied during times of emergency or severe shortage. In most cases, the first loads a utility will shed in these conditions are loads required by industrial and commercial customers. Institutional loads are typically the last to be shed since public institutions (hospitals, schools, municipal-lighting authorities, etc.) are considered to be a utility's most essential customers (Ref.: energyvortex.com).



The project will convert the three radial lines into a loop configuration providing a 115-kV backup source for all but 35 MW of the peak load in northern Vermont. The primary elements of the project include:

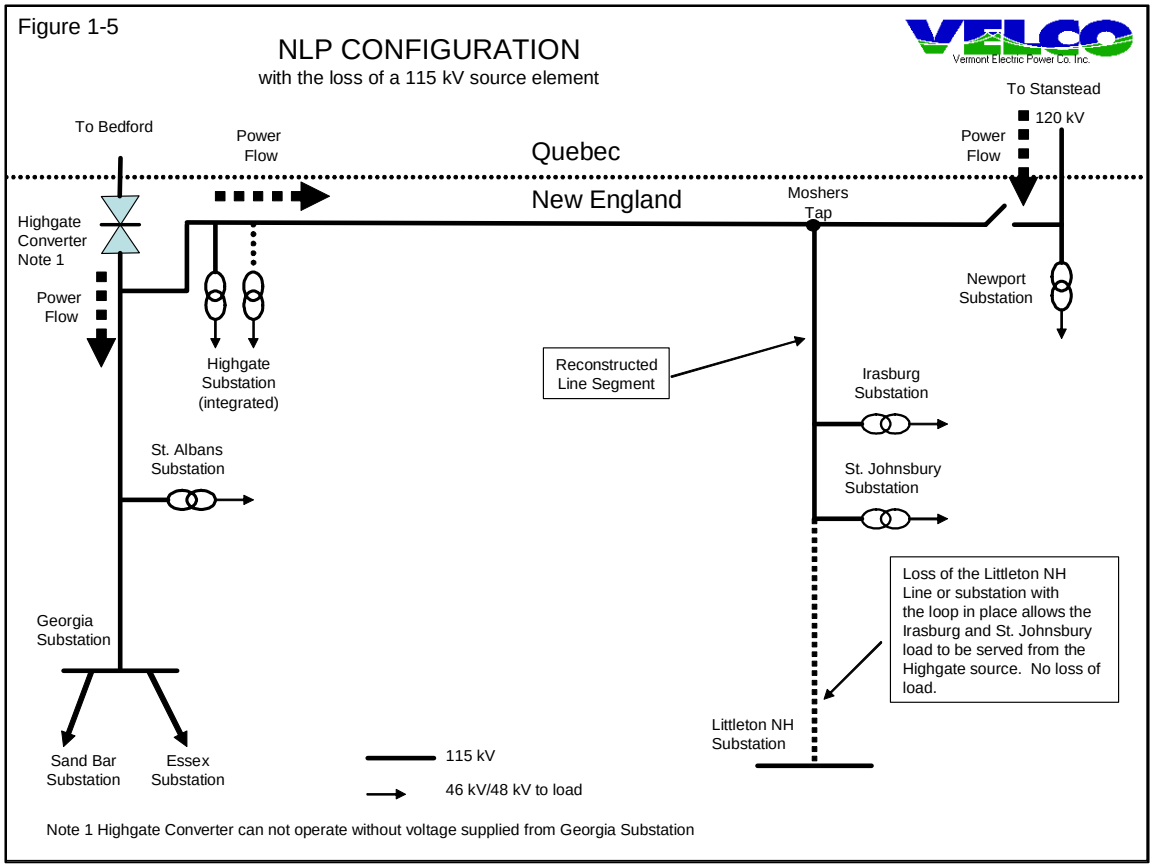
1. The replacement of an existing, 48-kV transmission line between Irasburg Substation and Mosher's Tap on the Newport-to-Highgate line with a single-pole, double-circuit, 115-kV/48kV lines;

2. Integration of the collocated Highgate VELCO and former Citizens Substations to facilitate the connection of the Newport-to-Highgate line to the Georgia-to-Highgate line; and

3. Upgrades at the existing St. Albans Tap; Irasburg and St. Johnsbury Substations to facilitate the isolation of electrical faults (interruptions of energy flows) on the line segments.

Figure 1-5 (NLP Configuration with the loss of a 115kV source element) describes the performance of the system for the same loss of the Littleton-to-St. Johnsbury line described in Figure 1-3:

Figure 1-5



In this example, the reconfigured network provides a 115-kV, back-up source for the Irasburg and St. Johnsbury Substations via the loop to Highgate, therefore eliminating the loss of load in St. Johnsbury previously described. This configuration also provides a 115-kV backup source for the remaining radial load served at Newport Substation if its supply from Québec is interrupted.

Overall, VELCO states that the Northern Loop Project would address the type of problem shown in Figures 1-3 through 1-5 and provide both reliability and loss-savings improvements to the regional system and the Vermont system, which in turn would benefit VEC, Central Vermont Public Service Corporation, Green Mountain Power Corporation, Burlington Electric Department, various municipal electric departments, and all of their customers, because:

- It reconfigures St. Johnsbury, Irasburg, Highgate and St. Albans Substations from a radial to a loop feed, which directly benefits approximately 80 MW of load;
- It has the potential to help protect northwestern Vermont in the event of a "contingency," i.e., an event on the transmission system–usually an equipment failure or a weather-related incident–that causes a line to open up on two of the system's most important ties (loss of the PV20 tie to New York or loss of the Highgate-converter tie to Québec)—either event, the Northern Loop Project would provide a path for power to be imported from the Littleton, NH, area;
- It would provide VEC with two feeds (east and west) instead of solely depending on the eastern feed, thus improving its reliability for its block load of 70 MW;
- By looping the 120-kV line, the existing facilities could be rolled into the New England Pool Transmission Facilities ("PTF").
- Currently, maintenance on the Highgate-to-Georgia line is very difficult to schedule because the existing line is radial, and taking it out of service compromises the area's reliability so maintenance has to be scheduled for either evening hours or weekends when the load is low—closing the loop would enable maintenance outages to be taken on all the new looped facilities; and

- This project would reduce losses in both the VEC system and the VELCO system ranging from about ½ MW to 4 MW, depending on loads and system operating conditions.

Vermont continues to pursue programs to encourage conservation, such as funding Energy Efficiency of Vermont, a utility established to operate efficiency and conservation programs for almost all of Vermont's electric utilities. Even with a fairly aggressive program in place, however, load in Vermont continues to grow. As mentioned above, 80 MW of load currently supplied by radial lines serves customers in load pockets that are experiencing some of the highest electric-growth rates in the state. Through the proposed Northern Loop Project, VELCO indicates that those load areas would be supplied by looped transmission facilities, thus increasing the reliability of the area not just for current load but for future demand as well.

1.3.2 The Department of Energy's Purpose and Need

NEPA requires Federal decision makers to consider the environmental effects of their actions. An agency's statement of purpose and need defines the reason and context for that agency's action, i.e., it explains what the agency is called upon to do, given its authority. The purpose and need for DOE action is to determine whether it is in the public interest to grant or deny VELCO's application to amend two Presidential Permits (PP-66 and PP-82) for the construction, operation and maintenance of electrical facilities that cross the United States–Canada border in two places within the State of Vermont, as described on the preceding pages. Like all Federal agencies, DOE must comply with NEPA.

In determining whether a proposed action is in the public interest, DOE considers the impact of the proposed project on the environment and on the reliability of the U.S. electric power supply system. DOE also must obtain the concurrence of the Departments of State and Defense before it may grant a Presidential Permit. If DOE determines that granting a Presidential Permit is in the public interest, the information contained in this Environmental Assessment (EA) will provide a basis upon which DOE decides which alternative(s) and mitigation measures are appropriate for inclusion as conditions of the permit. In a process that is separate from NEPA, DOE will determine whether the proposed project will adversely impact the reliability of the U.S. electric system. Also, before authorizing imports from Canada over the facilities, DOE must ensure that the imports will not impair sufficiency of electric supply within the United States and will not impede, or tend to impede, the coordinated use of the regional transmission system. Issuance of a Presidential Permit only indicates that DOE has no objection to the project, but does not mandate that the project be completed.

1.3.3 Purpose of Environmental Assessment

In accordance with DOE's NEPA Implementing Procedures (10 CFR Part 1021), the proposed project requires preparation of an Environmental Assessment or "EA." An EA is a concise public document which serves to (a) briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact (FONSI); (b) aid an agency's compliance with NEPA when no EIS is necessary; and (c) facilitate preparation of an EIS when necessary. The purpose of this EA is to describe the potential impacts associated with the proposed project. This EA has been prepared to be consistent with the Council on Environmental

Quality (CEQ) regulations implementing the procedural provisions of the NEPA (40 CFR 1500 - 1508).

1.4 Detail Of Proposed Project

1.4.1 Purchase and Use of Citizens' Communications Transmission Assets

Citizens and VELCO entered into a purchase-and-sale agreement, dated March 18, 2003, pursuant to which Citizens subsequently transferred to VELCO its right, title and interest in the following Vermont transmission facilities (the "Transmission Facilities"):

1. Approximately 3 miles of a single-circuit, 120-kV, transmission line between the international border at Derby Line and Derby, Vermont;

2. Approximately 29.4 miles of a double-circuit transmission line constructed at 120 kV between Derby and Richford, Vermont, of which currently one circuit is operated at 120 kV and the other circuit is operated at 48 kV;

3. Approximately 6.47 miles of a single-circuit, 48-kV line located between the Mosher's Tap switching structure in Newport and Irasburg, Vermont;

4. Approximately 23 miles of a single-circuit, 120-kV line located between the termination of the double-circuit, 120/48-kV line at Richford Substation and Highgate Substation; and

5. All assets located in the Border Substation, located at the international border in Derby Line, Vermont.

This change (utilization of the purchased Citizens assets) would reduce peak imports from TransEnergie in Québec over the interconnection facilities so that certain of the Transmission Facilities formerly used by Citizens–and now used by VELCO after its purchase of these facilities from Citizens–to transmit part of the imported energy to Highgate, Vermont, instead may be used to electrically connect facilities operated by VELCO in northeastern Vermont (terminating at its Irasburg Substation) to facilities operated by VELCO in northwestern Vermont (terminating at Highgate Substation).

This operational change requires:

1. Replacement of the existing, 48-kV, transmission line within the existing ROW between VELCO's Irasburg Substation and the so-called "Mosher's Tap" – on the existing line between Newport and Highgate Substations – with a new, double-circuit (115-kV/48-kV) line;

2. Connection of this line's 115-kV circuit to one circuit of the existing Mosher's Tap-Highgate Substation line, now operated at 120 kV but to be operated thereafter at 115 kV;

3. Connection of this 115-kV circuit at Highgate Substation to VELCO's existing 115-kV bus;

4. Consolidation of now-separate substations in Highgate, a project that would connect the Highgate Interconnection Facilities (north of the converter terminal) to the 120-kV bus in Highgate Substation (the "Highgate Tap"); and

5. Related improvements to three VELCO substations (St. Johnsbury, Irasburg and St. Albans).

Looping VELCO's system means that one circuit between Mosher's Tap and Highgate Substation (currently operated at 120 kV) can no longer be used to supply approximately 35 MW of the Northwest Load by energy imported from TransEnergie over the Derby Interconnection Facilities. These facilities are normally synchronized to TransEnergie's system, whereas the looped facilities would be synchronized to the other systems in the Northeast with which VELCO is interconnected.

As a result, VELCO would disconnect the 120-kV circuit at Mosher's Tap, so that it would no longer be connected to the Derby Interconnection Facilities, and these facilities would thereafter be used only to import energy from TransEnergie to Newport Substation to supply the Northeast-Central Load and not to serve the Northwest Load; the change would reduce peak flows over the Derby Interconnection Facilities to approximately 35 MW as compared to around 70 MW today.

After the change, the Northwest Load could be served either by imports from TransEnergie over the Highgate Interconnection Facilities or by VELCO from its own system at Highgate. If the Northwest Load is served over the Highgate Interconnection Facilities (i.e., block-loaded to Canada), it may be necessary to increase imports over these facilities from the 225 MW currently

authorized by PP-82 to 250 MW.[6] Up to 35 MW of load would flow over the Highgate Tap to serve the Northwest Load.

1.4.2 Mosher's Tap to Irasburg 115/48kV Double Circuit Build

VELCO plans to acquire better easements and the appropriate permits to replace an existing 6.47-mile, 48-kV, transmission line with a 115-kV/48–kV, double-circuit, line between Mosher's Tap and Irasburg Substation. The new 115-kV circuit would utilize type "1272 ACSR" conductor[7]. The 48-kV circuit would be re-conductored with new conductor (type "556 ACSR"). Conceptually, the line is being designed for wood or laminated-wood poles – with some Corten™ steel poles –and side-by-side, symmetrical, 115-kV insulators. Figure 1-6 shows how the new line would appear.

Figure 1-6

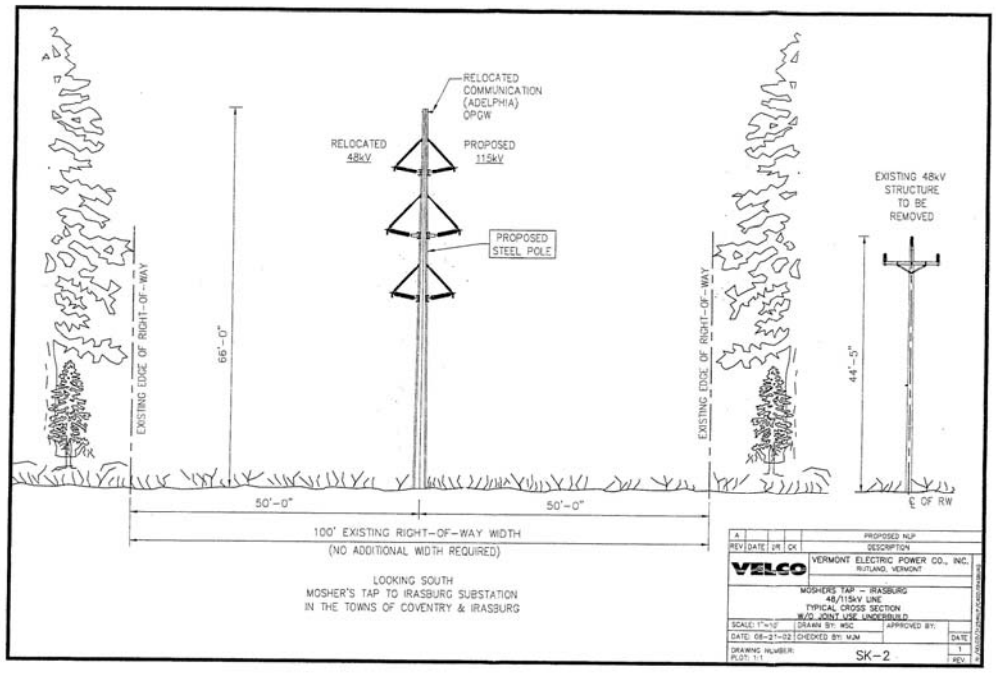


Figure 1-6

6 No change to maximum flows through the converter terminal (which has a continuous-overload capacity of 225 MW) would result.

7 ACSR: Aluminum conductor, steel reinforced. The number 1272 refers to the cable size, i.e., 1272K circular mils.

Where possible, the new poles would be located as close to the current pole locations as feasible. Where environmentally beneficial, and if the line design permits relocation of poles already in sensitive areas, VELCO will do so.

There now exist two sections of this line that are under-built with a 12.5-kV distribution line. The first section is 1.1 miles, and the other section is 1.3 miles. VEC would be responsible for the capital carrying costs and for the maintenance of these distribution facilities. VELCO and VEC would work with Adelphia Cable or its successor to remove the existing All Dielectric Self-Supporting (ADSS) fiber-optic communications cable and replace it with Optical Ground Wire (OPGW) to minimize wires on the pole; OPGW provides both fiber-optic communications and shield-wire capability in one wire, thereby eliminating a second wire.

1.4.3 Highgate Expansion

Currently, there are two substations located almost back-to-back at Highgate: VELCO has a 4-breaker, 48-kV, radial bus, and Citizens had a 5-breaker, 48-kV, ring bus (now owned by VELCO) located directly behind VELCO's substation. It is VELCO's intent to combine the substations, as described below.

VELCO has purchased the real estate and all of the 120-kV and 48-kV assets within what was previously Citizens' Highgate Substation. VEC would continue to own the 48-kV lines terminating at the substation. The 48-kV ring bus would be reconfigured to continue to provide

VEC with the operating flexibility VEC currently has for serving its customers. One additional 48-kV breaker would be inserted in the present ring bus to aid in this purpose.

Additionally, to supply the reactive power now necessary to support VEC's ability to feed its Northwest Load from the east, the 6.14-MVAR[8] capacitor bank that currently resides in the VELCO bus would be moved over to the combined, 48-kV bus. A new 5.4-MVAR capacitor bank would also be installed at the 48-kV bus. Two 15-MVAR synchronous condensers (explained below), located within the substation, may also be necessary to support the new configuration as well as two 120-kV capacitor banks supplying a total of 30 MVAR.

VELCO would rebuild its existing radial bus into a 5-breaker, 115-kV, ring bus for increased reliability and flexibility. This new ring bus would become the terminus for the 115-kV line from Newport as well as for the VELCO line coming from the U.S. side of the Highgate Converter Station and the VELCO line going south toward St. Albans. Additionally, a normally-open feed to the VEC system would also exist to supply a back-up feed from the VELCO system when necessary. The two substations, currently located within 120 feet of each other, would be combined into one, with a security fence around all equipment. Figure 1-3 is an orthophoto[9]

---

8 MVAR: Mega Volt Ampere Reactive. Reactive power is the component of power that is a by-product of alternating current and is expressed in VAr (Volt-Ampere reactive). Reactive power is produced when the voltage is out of phase or is at 90 degrees with the current. It establishes and sustains electric and magnetic fields of various alternating-current equipment, such as motors and transformers (Ref.: www.energyvortex.com).

9 An "ortho photo" is a short form of photochromatic, which the Merriam-Webster OnLine Dictionary defines as, "of, relating to, or producing tone values of light and shade in a photograph that correspond to the tones in nature."

showing the existing two-substation plan, while Figure 1-4 is an orthophoto that show the combined substation's plan**.**

1.4.4 Improvements at Other Substations

At VELCO's St. Johnsbury Substation, there would be two new 115-kV circuit breakers added along with protection and control equipment for those new breakers. This would require an addition to the existing control building. All of this work would be done within the existing substation fence. Additionally, a new septic system would be installed.

Additions to Irasburg Substation would include two 115-kV circuit breakers, one located on the line coming north from St. Johnsbury and the other located on the new section of line going toward Mosher's Tap. With the addition of these new breakers, protection and control equipment would need to added, which would require the enlargement of the existing control building.

VELCO plans to install two motor-operated disconnect (MOD) switches on its 115-kV line at St. Albans where the line that supplies St. Albans is tapped into the VELCO Highgate-to-Georgia line. The purpose of these MOD switches is to protect the St. Albans area load from extended outages due to permanent faults on the St. Albans-to-Georgia line as well as provide the ability to perform scheduled and unscheduled maintenance on that line segment. The disconnect switches would be located one structure north and south of the tap. Additionally, a storage hut of approximately 10 ft. x 10 ft. would be added to house the battery supply, "SCADA RTU" (Supervisory Controlled And Data Acquisition Remote Terminal Unit), switching station, fiber

optics, heater and air conditioner, AC-distribution panel and a wall-mounted motor-operated disconnect "MOD" control panel.

1.5 State Proceedings

In addition to a Presidential Permit from DOE, VELCO needed and has received a Certificate of Public Good (CPG) from the Vermont Public Service Board (PSB) as required by Vermont law (Section 248 of Title 30, Vermont Statutes Annotated). Paraphrased, Section 248 requires VELCO to demonstrate that the project would promote the general good of the state, specifically, that the project: (1) would not unduly interfere with orderly development of the region; (2) is required to meet present and future demand for service; (3) would not adversely affect system stability and reliability; (4) is economic; (5) would not have an undue adverse affect on aesthetics, historic sites, air and water purity, the natural environment and the public health and safety; and (6) complies with the Vermont Twenty Year Electric Plan or, if not, that there exists good cause to permit the proposed action.

Hearings in the Section 248 proceedings were held during May 2003, and the PSB's Order and CPG approving the project were issued on July 17, 2003. Appendix B contains a copy of the decision, order, and CPG approving the Northern Loop Project. The PSB found that the project was consistent with the requirements of Section 248 of Title 30 and would promote the general good by improving the reliability of the electrical systems in the northern part of the state, thus benefiting consumers throughout the northern part of Vermont. The PSB also found that the proposed project would not have an undue adverse affect on the aesthetics or scenic and natural beauty of the area.

VELCO has also applied for and received several other Vermont and federal permits required for the Northern Loop Project, including waste-water permits for the Irasburg and St. Johnsbury Substations, a wetlands Conditional Use Determination permit (CUD) from the Vermont Agency of Natural Resources (ANR), and an Army Corps of Engineers (COE) permit. Copies of these four permits are included in Appendix B. No other local or state approvals are required for the project to be constructed. VELCO has, however, worked closely with the Vermont Department of Public Service, numerous divisions within the Vermont Agency of Natural Resources, the Vermont Agency of Agriculture, the Vermont Division for Historic Preservation, the Vermont Non-game and Natural Heritage Program and the Vermont Department of Fish and Wildlife as well as officials of the affected towns and regional planning commissions and COE. In addition, the Department of Public Service also conducted an independent review of VELCO's proposal, representing the interests of all affected state agencies and working with the individual communities. Appendix B contains copies of all associated letters.